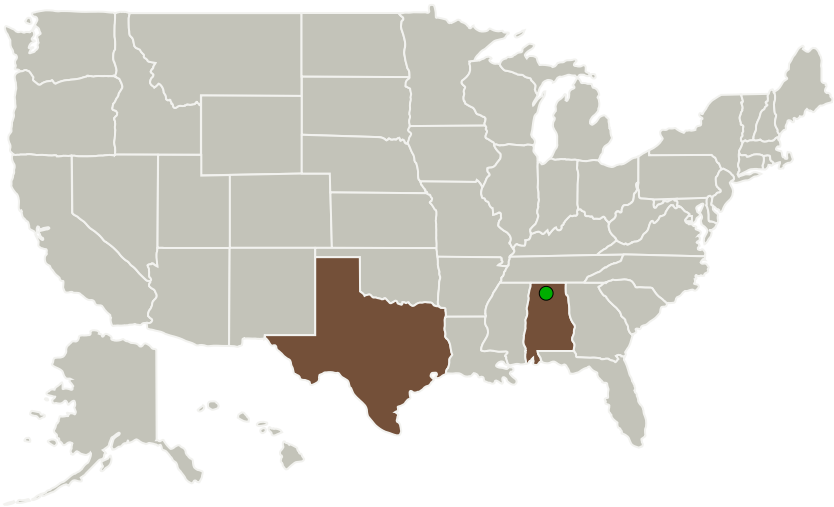
Low Cost Very Large Diamond Turned Metal Mirror, Phase II

Completed Technology Project (2010 - 2013)

Project Introduction

Electrolytic plating of high phosphorus nickel phosphorus alloy will encapsulate a machined mirror substrate master made of fine cell plastic foam such as polystyrene that has been sealed and made electrically conductive with painted-on coatings. After encapsulation with up to one millimeter of NiP metal holes will be drilled and the plastic master will be dissolved with a solvent such as acetone and removed. Prior to encapsulation plating round or other cross section tubes are inserted thru holes in the plastic foam so that they are incorporated into the electroformed mirror structure when the master is encapsulated with more NiP. The tubes which connect the front and back surfaces of the mirror are made by electroforming with the same NiP alloy. The finished mirror substrate will be diamond turned and the very low cutting force diamond turning process will allow fabrication of a very thin mirror face plate without print through since there is only a very low pressure on the mirror from diamond turning. Machining of plastic foam is accomplished very quickly and the foam material is very low cost. In a production mode the expendable foam plastic masters could themselves be molded. The size of the mirrors is only limited by the capacities of the plating bath and the diamond turning machine. The process is applicable to any optical contour and to the manufacture of off-axis segments.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Dallas Optical Systems, Inc.	Lead Organization	Industry Veteran-Owned Small Business (VOSB)	Rockwall, Texas
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Texas

Project Transitions

March 2010: Project Start

June 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139171)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Dallas Optical Systems, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

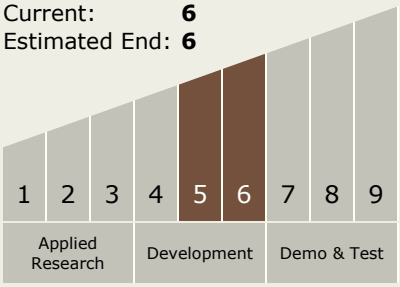
Carlos Torrez

Principal Investigator:

John M Casstevens

Technology Maturity (TRL)

Start: **5**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.2 Observatories
    - TX08.2.1 Mirror Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System